(19) World Intellectual Property Organization International Bureau





(43) International Publication Date 11 November 2004 (11.11.2004)

PCT

(10) International Publication Number WO 2004/097287 A3

(51) International Patent Classification7: F17C 13/04, C09K 3/10

F16J 15/00,

(21) International Application Number:

PCT/JP2004/006043

(22) International Filing Date: 27 April 2004 (27.04.2004)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

2003-125508 60/470,895

30 April 2003 (30.04.2003) IP 16 May 2003 (16.05.2003)

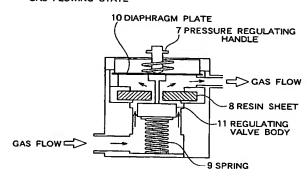
(71) Applicant (for all designated States except US): SHOWA DENKO K.K. [JP/JP]; 13-9, Shibadaimon 1-chome, Minato-ku, Tokyo, 1058518 (JP).

- (72) Inventors; and
- (75) Inventors/Applicants (for US only): TAGUCHI, Hiroyasu [JP/JP]; c/o Production & Technology Control Department, Gases & Chemicals Division, SHOWA DENKO K.K., 5-1, Ogimachi, Kawasaki-ku, Kawasaki-shi, Kanagawa, 2100867 (JP). KOSUGE, Yasuhiro [JP/JP]; c/o Production & Technology Control Department, Gases & Chemicals Division, SHOWA DENKO K.K., 5-1, Ogimachi, Kawasaki-ku, Kawasaki-shi, Kanagawa, 2100867 (JP).
- (74) Agent: SUZUKI, Shunichiro; S.SUZUKI & ASSO-CIATES, Gotanda Yamazaki Bldg. 6F, 13-6, Nishigotanda 7-chome, Shinagawa-ku, Tokyo, 1410031 (JP).
- (81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE,

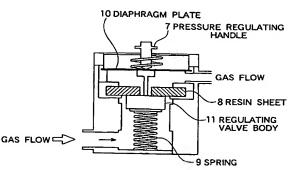
[Continued on next page]

(54) Title: APPARATUS AND METHOD FOR FEEDING HIGH-PURITY AMMONIA GAS

GAS FLOWING STATE



CLOSED STATE



SEALED BY REGULATING VALVE BODY 11 AND RESIN SHEET 8

(57) Abstract: It is an object of the present invention to provide a system for feeding a high-purity ammonia gas, where a feeding apparatus free from generation of a particle due to corrosion and not causing the formation of a corrosion or reaction product inside the gas feeding path, such as cylinder valve, pressure regulator, pressure gauge, mass flow controller, line valve and filter, is appropriately employed for the gas flow path from a gas cylinder to a production apparatus, thereby realizing more safe and highly efficient feeding of the high-purity ammonia gas without deteriorating the purity and production of a semiconductor device having higher performance. The apparatus for feeding a high-purity ammonia gas of the present invention comprises the sealing part and/or the gas contacting part which comprise a halogen-free resin. The gas flow path of feeding a high-purity ammonia gas is constituted by the above-described high-purity ammonia gasfeeding apparatus, and thereby a high-purity ammonia gas can be fed to an apparatus for producing a semiconductor device without deteriorating the gas purity.





KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

- with international search report
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments
- (88) Date of publication of the international search report: 16 December 2004

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

INTERNATIONAL SEARCH REPORT

Interpletion No PCT/JP2004/006043

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 F16J15/00 F17C13/04 C09K3/10 According to International Patent Classification (IPC) or to both national classification and IPC B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) IPC 7 F16J Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched Electronic data base consulted during the international search (name of data base and, where practical, search terms used) EPO-Internal, PAJ, WPI Data C. DOCUMENTS CONSIDERED TO BE RELEVANT Category ° Citation of document, with Indication, where appropriate, of the relevant passages Relevant to claim No. US 5 149 105 A (LOECHELT II CECIL P ET X 1-10 AL) 22 September 1992 (1992-09-22) column 3, lines 44-55 column 4, lines 1-26 Α PATENT ABSTRACTS OF JAPAN 1-10 vol. 2002, no. 12, 12 December 2002 (2002-12-12) & JP 2002 228344 A (SUMITOMO BAKELITE CO LTD), 14 August 2002 (2002-08-14) abstract Α PATENT ABSTRACTS OF JAPAN 1-10 vol. 1997, no. 06, 30 June 1997 (1997-06-30) & JP 9 032928 A (NIPPON VALQUA IND LTD), 7 February 1997 (1997-02-07) abstract Further documents are listed in the continuation of box C. X Patent family members are listed in annex. Special categories of cited documents: *T* tater document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier document but published on or after the international Invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone filing date "L" document which may throw doubts on priority claim(s) or which is clied to establish the publication date of another citation or other special reason (as specified) "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art. "O" document referring to an oral disclosure, use, exhibition or other means document published prior to the international filing date but later than the priority date claimed *&* document member of the same patent family Date of the actual completion of the international search Date of mailing of the International search report 21 October 2004 03/11/2004 Name and mailing address of the ISA Authorized officer European Palent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl. Fax: (+31-70) 340-3016 Ott, T

INTERNATIONAL SEARCH REPORT

Intentional Application No PCT/JP2004/006043

C./Contime	ation) DOCUMENTS CONSIDERED TO BE RELEVANT	PCT/JP2004/006043		
Category °	Citation of document, with indication, where appropriate, of the relevant passages	12:		
J ,	passages	Relevant to claim No.		
A	US 5 237 001 A (LINDNER CHRISTIAN ET AL) 17 August 1993 (1993-08-17) column 1, lines 12,29 column 2, line 43	1-10		
A	US 2 951 721 A (ASP HOWARD L) 6 September 1960 (1960-09-06) column 1, lines 15-36	1-10		
	,	•		
	(continuation of second sheet) (January 2004)			

INTERNATIONAL SEARCH REPORT

Int	onal Application No
PCT/	onal Application No JP2004/006043

			, ,			
Patent document cited in search report		Publication date	Patent fami member(s			Publication date
US 5149105	Α	22-09-1992	US	5331841	A	26-07-1994
JP 2002228344	Α	14-08-2002	NONE			
JP 9032928	Α	07-02-1997	NONE.			
US 5237001	А	17-08-1993	DE CA DE EP JP	4019799 2044743 59108167 0462471 4226154	A1 D1 A2	02-01-1992 22-12-1991 17-10-1996 27-12-1991 14-08-1992
US 2951721	А	06-09-1960	NONE			